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VIRGIN ISLANDS AGRICULTURAL EXPERIMENT STATION,

LONGFIELD SMITH, Agronomist in Charge,
St. Croix, Virgin Islands, U. S. A.

Under the supervision of the STATES RELATIONS SERVICE,
Office of Experiment Stations, U. S. Department of Agriculture.

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REPORT OF THE VIRGIN ISLANDS AGRICULTURAL EXPERIMENT STATION.

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VIRGIN ISLANDS AGRICULTURAL EXPERIMENT STATION, ST. CROIX.

[Under the supervision of A. C. True, Director, States Relations Service, United States Department of Agriculture.]

E. W. ALLEN, *Chief, Office of Experiment Stations.*
WALTER H. EVANS, *Chief, Division of Insular Stations,*
Office of Experiment Stations.

STATION STAFF.

LONGFIELD SMITH, *Agronomist in Charge.*
CHARLES E. WILSON, *Entomologist.*

LETTER OF TRANSMITTAL.

AGRICULTURAL EXPERIMENT STATION,
St. Croix, Virgin Islands, August 13, 1920.

SIR: I have the honor to transmit herewith and to recommend for publication a report of the Virgin Islands Agricultural Experiment Station, 1920.

Respectfully,

LONGFIELD SMITH,
Agronomist in Charge.

DR. A. C. TRUE,
Director States Relations Service,
U. S. Department of Agriculture, Washington, D. C.

Publication recommended:
A. C. TRUE, *Director.*

Publication authorized:
E. T. MEREDITH, *Secretary of Agriculture.*

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REPORT OF THE VIRGIN ISLANDS AGRICULTURAL EXPERIMENT STATION, 1920.

By Longfield Smith, *Agronomist in Charge.*

INTRODUCTION.

The agricultural experiment station is situated in St. Croix, the largest island of the group comprising the Virgin Islands. Since its establishment in 1911, the station has served as the only immediate agency whereby people in St. Croix and the neighboring islands are kept in touch with up-to-date, systematic agricultural methods. During the past year the agronomist in charge and the entomologist visited the islands of St. Thomas and St. John for the purpose of getting in closer touch with those interested in, and desiring information relative to, agriculture. As a result of these visits, inquiries have begun to come in from the people, and some distribution of seeds, cuttings, fruits, vegetables, and grasses has been made. The station hopes to continue to act as the medium of exchange where information can be had for the asking, so that the residents of the several islands will gradually be induced to adopt more progressive agricultural methods and eventually form into enterprising communities.

ST. THOMAS.

On the island of St. Thomas there were in 1917, 10,191 persons, about 500 of whom are of French extraction. (Pl. I, fig. 1.) The island appears especially adapted to cattle raising, an industry that could be greatly extended, because guinea grass grows in abundance even along the hillsides and invariably springs up in most sections after the land is cleared. During the year some progress was made in this direction, a fine stock farm having been started. The owner has on this farm a splendid registered Ayrshire bull (Hobsland Record Piece, No. 54821) (Pl. I, fig. 2), several imported Ayrshire cows, some fine horses, Chester White pigs, Dorset sheep, and other purebred stock, as well as a silo and a cattle-dipping vat. With such an equipment, the stock farm should serve as a model for all those who are engaged in the stock-raising industry in St. Thomas. The station has recommended that the silo be filled with elephant (Napier) grass, corn, and velvet beans. Several thousand cuttings of elephant grass have been sent from the station to the island of St. Thomas, together with a quantity of seed of acclimatized corn and velvet beans; and an effort is being made to encourage the erection of other silos, so that stock raising will not be so subject to interruption on account of droughts.

Owing to its very hilly nature, the island of St. Thomas is not well adapted to the raising of crops requiring much cultivation. St. Thomas, on account of its naval station and the port of Charlotte Amalie where numerous vessels stop, is a good market for vegetables. At present the demand for vegetables is largely met by the neighboring British Island, Tortola. The experiment station is endeavoring to stimulate the growing of vegetables and fruit, and a large quantity of vegetable and papaya seed has been distributed with the hope that much more fruit and vegetables will be raised in the near future. Some very fine fruit has been grown in St. Thomas. Papaya and pineapples are the easiest fruits to raise; the soil is excellently adapted to pineapple growing.

Another industry that could be profitably conducted both in St. Thomas and in St. John is beekeeping. In St. Thomas one man is showing great enthusiasm in this industry, and others are becoming interested. The hurricane of 1916 destroyed all the bees in the island; and now that Italian bees from Porto Rico have been introduced there should be no difficulty in keeping the race pure.

ST. JOHN.

At one time the island of St. John was well cultivated, sugar cane then being its principal crop. Since 1867, however, when the island was visited by cholera and a destructive hurricane, it has been practically abandoned. The island now has no roads, and is covered with bush. (Pl. II, fig. 1.) Numerous bridle tracks are found leading in all directions, and a day's journey on horseback is rewarded by a wonderful panorama. At present the principal industry of the island is the manufacture of bay oil from the leaves of the bay tree (*Pimenta acris*), which grows wild over a large part of the island. One hundred and fifty pounds of bay leaves produce a bottle of bay oil that sells for $6.50. The cost of collecting the leaves is about 70 cents for each 150 pounds. A bay-leaf plantation is established by simply cutting down the bush and trees surrounding young bay trees, which then get enough light and air to outgrow their competitors. The bush and wood that is cut down is made into charcoal, which is sold in the islands of St. Thomas and St. Croix.

The inhabitants of the island of St. John make beautiful baskets from the stems of the hoop vine, and dainty table mats from the stems of a vine locally known as "black wis." Mr. Blair, inspector of schools for the Virgin Islands, attempted to foster this small industry by introducing basket weaving and mat making into the public schools of the island. It would certainly be well worth while to develop this industry further.

Vegetable and fruit growing could be profitably undertaken on the island of St. John. Some attempt at vegetable raising has already been made, and one planter has succeeded in growing cabbages and tomatoes. Pineapples, limes, oranges, papayas, and avocados could readily be raised in sufficient quantity to supply the island of St. Thomas. The climate of St. John is better adapted to fruit and vegetable raising that thae of either St. Thomas or St. Croix.

WORK AT THE ST. CROIX STATION.

THE SUGAR INDUSTRY.

The sugar industry, which was greatly stimulated in St. Croix as elsewhere by war conditions, was very profitable the past year on account of the high prices paid for sugar. The yield of cane, too, was unusually good, owing to favorable weather. Scarcity of labor has been instrumental in bringing about a greater adoption of labor-saving machinery for the preparation and cultivation of lands planted to cane.

During the year the following three projects were undertaken by the experiment station to better the sugar industry: (1) Cane-breeding experiments having for their object the raising of new varieties, some of which may prove superior in sugar-yielding capacity to any existing sorts; (2) cane variety experiments having for their object the testing out in plats of existing varieties, together with new varieties raised in the cane-breeding experiments to determine which are superior to the standard cane, Ribbon; and (3) control of soil grubs in cane cultivation.

CANE-BREEDING EXPERIMENTS.

Seeds of two superior varieties of cane, S. C. 12/4 and S. C. 14/7, were sown in boxes in December, 1919. Approximately 3,000 seedlings were produced from this seed and planted in pots in March. In May 2,000 of these seedlings were transplanted in the ground. The great majority of them died, however, owing to lack of rain. The remaining potted seedlings were kept moist with cistern water until the supply was exhausted; they were then watered from a small near-by stream. This water is distinctly brackish and unfortunately has killed the majority of the seedlings. Up to the time of writing this report the weather had not improved sufficiently to permit of planting out the surviving seedlings.

CANE-VARIETY EXPERIMENTS.

The plats of cane varieties have grown well and given much satisfaction. The table following shows the results of the experiments with the different varieties of sugar cane grown in field No. 4.

Comparative test of cane varieties grown in various sized plats in Field No. 4 from Dec. 15, 1918, to Mar. 30, 1919.

Date of harvesting.	Variety.	Size of plat.	Weight of cane per plat.	Calculated weight of cane per acre.	Increase or decrease of cane per acre compared with Ribbon cane.	Juice extracted from 100 pounds of cane by small mill.	Analysis of juice.			Sucrose per acre extracted by small mill.	Increase or decrease of sucrose per acre compared with that of Ribbon cane.
							Total solids.	Sucrose content.	Coefficient of purity.		
1920.		*Feet.*	*Lbs.*	*Tons.*	*Tons.*	*Lbs.*	*Per ct.*	*Per ct.*		*Lbs.*	*Lbs*
Feb. 13	S. C. 12/4	57 by 14	1,386	34	6.7	57	21.5	20.43	95	8,873	3,076
	Ribbon	57 by 14	1,114	27.3	....	53	19.5	17.9	92	5,797	....
	S. C. 12/4	111 by 14	3,074	38.4	6.4	50	21.5	20.43	95	8,790	2,269
	Ribbon	111 by 14	2,556	32	....	51	19.5	17.9	92	6,521	....
14	S. C. 12/4	60 by 14	1,267	29.4	1.8	47	21.5	20.43	95	6,322	38
	Ribbon	60 by 14	1,345	31.2	....	51	19.5	17.9	92	6,360	....
16	S. C. 14/7	38 by 14	1,036	37.9	1.9	52.2	18.7	16.53	88.4	7,326	382
	Ribbon	38 by 14	994	36	....	48.9	19.2	17.6	91.1	6,944	....
	S. C. 12/37	75 by 14	1,776	33	3.1	48	19.6	18.01	91.9	6,387	584
	Ribbon	97 by 7	1,264	36.1	....	49	19.2	17.6	91.1	6,971	....
	B. H. 10/12	16 by 14	516	45	20.4	49	19.9	18.1	91	8,941	4,285
	Ribbon	16 by 7	142	24.6	....	48	19.2	17.6	91.1	4,656	....
	S. C. 12/4	80 by 14	1,763	30.7	12.4	45	20.4	18.6	91	5,756	2,232
	Ribbon	80 by 7	526	18.3	....	49	19.2	17.6	91.1	3,524	....
	B. 3390	24 by 14	596	34.5	6.5	47	19.1	16.53	86.5	6,005	1,049
	Ribbon	57 by 14	1,174	28	....	47	18.5	16.81	90.8	4,956	....
17	B. 16536	30 by 14	950	44	16.7	44	17.7	15.07	85.1	6,534	1,702
	Ribbon	30 by 7	294	27.3	....	47	18.5	16.81	90.9	4,832	....
	B. 6388	87 by 14	2,786	44.8	23.8	49.5	15.9	13.23	83.2	6,572	2,480
	Ribbon	87 by 7	654	21	....	47	19.8	18.5	93	4,092	....
	B. 6292	40 by 14	866	30.1	4.3	52	18.6	16.42	88.3	5,758	331
	Ribbon	41 by 21	1,518	34.4	....	47	18.5	16.81	90.9	6,089	....
18	Yellow Caledonia	27 by 14	612	31.4	.4	46	19.2	17.6	92	5,696	501
	Ribbon	56 by 14	1,280	31.8	....	47	19.8	18.5	93	6,197	....
19	S. C. 13/13	75 by 14	2,070	39	11	44	19.7	18.28	92.8	7,024	1,430
	do	120 by 14	3,041	35	7	44	19.7	18.28	92.8	6,304	710
	B. 3412	165 by 14	4,364	37	9	49.5	16.7	14.28	85.5	5,860	266
20	S. C. 13/13	103 by 14	2,500	33.5	5.5	42.5	19.6	18.18	92.7	5,798	204
24	Ribbon	60 by 14	1,520	28	....	49	19.7	18.2	92	5,594	....
	Cane Bay	34 by 14	1,038	34	5	49	19.9	17.4	87	6,493	994
	S. C. 13/13	42 by 14	1,112	37	2	42.5	19.6	18.18	92.7	6,404	1,083
	Ribbon	62 by 14	1,762	39	....	49	19.5	17.5	89.7	7,487	....
	S. C. 12/3	130 by 14	2,894	31	2.9	47	18.5	16.09	86.1	5,250	527
25	B. 3390	280 by 14	6,780	33	4.9	45.5	19	16.1	84.7	5,418	695
	Ribbon	192 by 14	3,940	28.1	....	48	17.3	15.53	89.8	4,723	....
Mar. 1	S. C. 13/13	300 by 14	8,662	40	4	43	18.9	17.06	95.5	6,577	342
3	do	250 by 14	7,498	40.2	4.2	42	19	17.7	93	6,690	229
5	do	144 by 14	4,960	49	13	42	19	17.7	93	8,155	1,236
	do	106 by 7	2,010	53	17	42	19	17.7	93	8,821	1,902
	Ribbon	32 by 14	824	36	....	48.5	19.5	17.7	91	6,919	....
	S. C. 12/11	43 by 14	1,026	33	2	49	17.8	16.2	91	5,863	830
9	S. C. 13/13	216 by 14	7,136	45	14	43	18.5	16.2	88	7,026	333
	B. 3922	180 by 14	4,520	34	3	50.5	17.7	15.6	88	6,534	159
	S. C. 13/13	216 by 14	7,136	45	14	43	18.5	16.3	88	7,056	363
	do	262 by 7	3,164	34	3	43	18.5	16.3	88	5,331	1,362
10	Ribbon	66 by 14	1,500	31	....	51	20.2	18.9	94	6,693	....
	S. C. 12/11	130 by 14	3,088	33	10	46.5	17.6	15.6	89	5,359	3,483
11	S. C. 12/37	253 by 14	7,530	41.3	1.7	49.5	20.8	19	91	8,705	137
	Ribbon	27 by 14	830	43	....	54	18.6	17	91	8,842	....
	S. C. 12/37	325 by 14	11,688	50.5	11.5	51	21.5	19.6	91	11,312	3,825
	S. C. 13/13	145 by 14	4,650	44.5	5.6	42.5	19.3	17	88	7,223	264
	S. C. 12/3	86 by 14	2,346	37.9	1.1	48.5	17.7	15.2	86	6,257	1,230
	Ribbon	62 by 14	1,762	39	....	49	19.5	17.5	89.7	7,487	....
12	S. C. 14/29	122 by 14	3,420	39	5.5	51.5	18.9	16.9	89.4	7,600	546
15	do	30 by 14	620	29	4.5	49	20.3	18.8	92.6	5,983	1,071
	Ribbon	70 by 14	1,688	33.5	....	50	20.3	18.8	92.6	7,054	....
16	S. C. 14/140	34 by 14	710	29	8.2	47	19.5	17.9	91.8	5,457	1,634
	Ribbon	217 by 14	5,794	37.2	....	51	17.6	16.7	94.9	7,091	....
	S. C. 13/13	145 by 14	3,218	31	4	46	19.5	17.7	90.8	5,652	307
	Ribbon	52 by 14	990	27	....	48	20.2	18.1	89.6	5,345	....
	S. C. 13/7	54 by 14	764	20	1.5	40	19.7	17.9	90.9	3,208	848
	Ribbon	40 by 7	306	21.5	....	48	19.4	17.7	91.2	4,056	....
	S. C. 15/50	44 by 7	258	16	8.1	38	20.1	17.9	89.1	2,437	1,811
	Crystallina	150 by 14	2,514	23	1.1	48	20	17.9	89.5	4,425	177
	Ribbon	399 by 14	6,938	24.1	....	49.5	17.9	15.9	88.8	4,248	....
	S. C. 15/76	12 by 7	106	24.2	2.8	45	18.6	16.4	88.2	4,001	239
17	S. C. 15/2	69 by 7	466	19	2.4	46	22.1	19.8	89.6	3,873	111
18	Ribbon	188 by 14	2,894	21.4	....	47	17.6	16.7	94.9	3,762	....

FIG. I.—PARTIAL VIEW OF HARBOR OF ST. THOMAS.

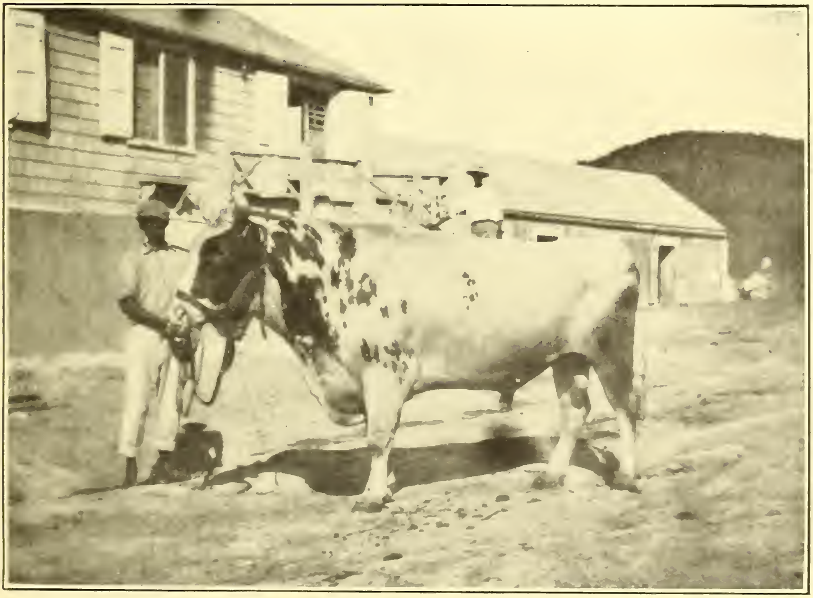

FIG. 2.—REGISTERED AYRSHIRE BULL, AYRDALE STOCK FARM, ST. THOMAS.

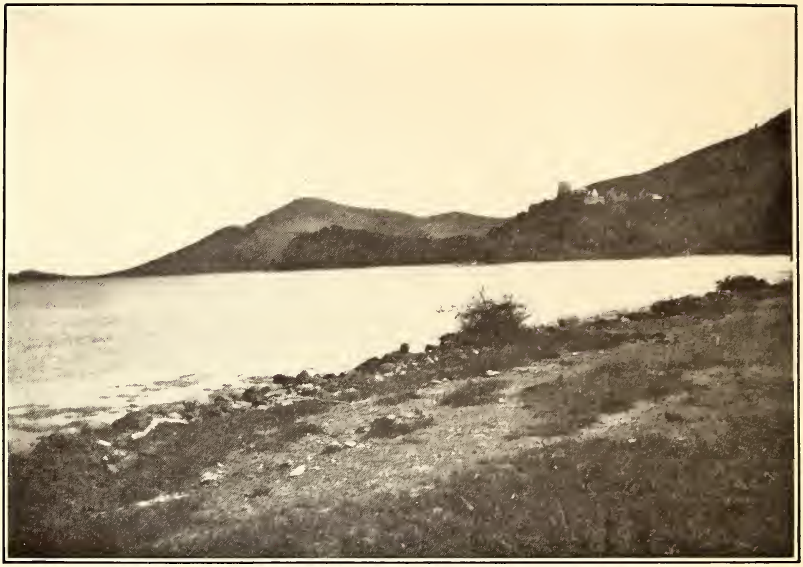

FIG. 1.—VIEW ON THE ISLAND OF ST. JOHN.

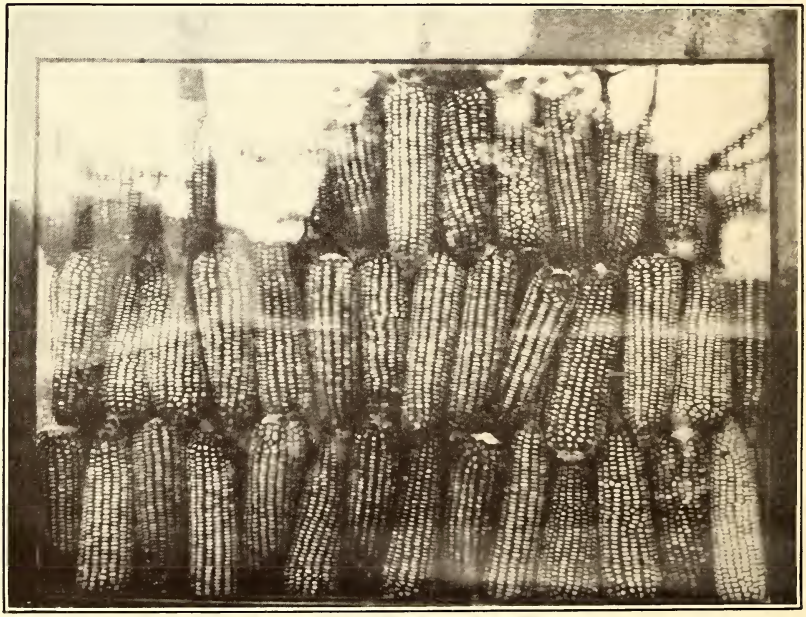

FIG. 2.—IMPROVED CORN GROWN AT ST. CROIX STATION.

Comparative test of cane varieties grown in various sized plats in Field No. 4 from Dec. 15, 1918, to Mar. 30, 1919—Continued.

Date of harvesting.	Variety.	Size of plat.	Weight of cane per acre.	Calculated weight of cane per acre.	Increase or decrease of cane per acre compared with Ribbon cane.	Juice extracted from 100 pounds of cane by small mill.	Analysis of juice.			Sucroses per acre extracted by small mill.	Increase or decrease of sucrose per acre compared with that of Ribbon cane.
							Total solids.	Sucrose content.	Coefficient of purity.		
1920.		*Feet.*	*Lbs.*	*Tons.*	*Tons.*	*Lbs.*	*P. ct.*	*P. ct.*		*Lbs.*	*Lbs.*
Mar. 18	D. 109	52 by 14	1,032	28	1	47.5	18.5	15.8	85.4	4,711	381
	Ribbon	58 by 14	1,212	29	....	47	17.6	16.7	94.9	5,092	....
	S. C. 14/140	112 by 14	1,996	24.8	.2	54.5	18.7	15.8	84.5	4,802	42
22	S. C. 14/108	84 by 14	1,784	29.5	4.5	46	19	18	94.7	5,471	627
	S. C. 14/20	28 by 14	524	26	1	50	19.3	17.4	90	5,067	223
	Ribbon	47 by 14	844	25	....	47.5	20.4	18.2	89.2	4,844	....
	S. C. 14/99	44 by 14	388	12.3	8	49	21.7	20.3	93.5	2,741	1,006
	S. C. 14/7	74 by 14	1,998	37.5	17.2	54	18	15.6	86.7	7,056	3,309
	Ribbon	160 by 14	2,340	20.3	....	45	19.9	18.3	92	3,747	....
23	B. 208	68 by 14	610	12.5	7.6	50	22.4	21	93.8	2,940	780
	Ribbon	52 by 14	756	20.1	....	45	19.9	18.3	92	3,720	....
	D. 109	50 by 14	804	22.3	6.1	46	19.5	16.9	86.7	3,896	1,664
	Ribbon	178 by 14	3,640	28.4	....	48	20	18.2	91	5,560	....
	S. C. 14/26	24 by 14	400	21.6	2.6	49	19.3	17.4	90	4,113	623
	Ribbon	36 by 14	490	19	....	45	19.9	18.3	92	3,490	....
25	S. C. 14/108	104 by 14	2,654	35	4	48	19	15.5	82	5,832	501
	Ribbon	76 by 14	1,710	31	....	44.5	21.4	20.5	95.8	6,333	....
	S. C. 12/37	22 by 14	800	50	31.4	49.5	21.5	19.8	92	10,976	8,005
	B. 4/596	76 by 14	1,730	31.6	13	50.5	17.7	15	84.7	5,365	2,394
	Ribbon	160 by 14	2,140	18.6	....	46	17.7	15.5	87.6	2,971	....
29	B. 208	128 by 7	1,122	24	8	49.5	21.9	20.5	93.6	5,457	1,202
	S. C. 12/4	150 by 14	2,648	25	7	47.5	20.9	19.2	91.9	5,107	1,552
	S. C. 12/11	128 by 14	2,196	24	8	50	19.8	17.6	88.9	4,731	1,928
	S. C. 14/30	88 by 14	1,330	20.8	11.2	50	20.3	18.2	89.7	4,240	2,419
	Crystallina	129 by 14	2,878	30.8	1.2	48	20	18.2	91	6,002	657
	S. C. 12/37	129 by 14	3,720	40	8	51.5	21.7	20.3	93.5	9,363	2,704
	Ribbon	115 by 14	2,644	32	....	50.5	19.5	18.4	94	6,659	....
Apr. 9	B. 4596	214 by 14	4,457	29.1	7.1	48	20.8	18.5	88.9	5,788	1,388
	Ribbon	32 by 14	500	22	....	46.5	21.7	19.2	88.5	4,400	....
	B. 208	120 by 7	800	19	7	46.5	21.5	20.2	94	3,996	1,205
12	Ribbon	118 by 14	2,230	26	....	46.5	21.7	19.2	88.5	5,201	....
13	Crystallina	142 by 14	2,770	27	12	48	20	17.9	90	5,195	3,192
	Ribbon	28 by 14	790	39	....	50	21.7	19.2	88.5	8,387	....
	S. C. 14/99	86 by 14	1,740	28	10.3	51	21.7	20.3	93.5	6,492	3,098
	S. C. 12/37	140 by 14	4,082	40.6	22.9	51.5	21.7	20.3	93.5	9,504	6,110
	B. 4596	177 by 14	3,730	29.3	11.6	50	19.8	16.7	84	5,480	2,086
17	do	248 by 14	5,790	32.5	14.8	50	19.8	16.7	84	6,079	2,685
	Ribbon	242 by 7	1,534	17.7	....	43	22.4	19.9	89	3,394	....
May 20	S. C. 13/13	194 by 14	3,430	25	....	40	21.5	19.7	82.3	4,413	202
	do	200 by 14	3,550	24.7	.3	40	21.5	19.7	91.6	4,360	149
26	Ribbon	80 by 14	1,410	25	....	44.5	20.8	16.9	81.3	4,211	....
	S. C. 13/28	80 by 14	1,332	23	8.5	47	19.8	16.2	81.8	3,921	1,385
	S. C. 14/93	100 by 14	2,175	30	1.5	52	20.2	15.5	76.7	5,416	110
28	do	287 by 14	8,857	43.9	12.4	52	20.2	15.5	76.7	7,926	2,620
	S. C. 14/102	382 by 14	8,342	30.2	1.3	40	22.5	17.2	76	4,654	652
	S. C. 14/86	82 by 14	1,310	22	9.5	48	20.3	15.4	75.9	3,642	1,364
	Ribbon	28 by 14	636	31.5	....	44.5	20.8	16.9	81.3	5,306	....
	S. C. 14/64	112 by 14	2,246	28	2	46	21.3	18.2	85.4	5,250	166
	Ribbon	23 by 14	430	26	....	45	22.7	19.4	85.5	5,084	....
	S. C. 14/29	136 by 14	2,312	24	5.1	40	21.8	17.3	79.4	3,559	2,132
	S. C. 12/37	344 by 14	7,846	31.5	2.4	49.5	21.5	19.8	92	6,915	1,224
	Ribbon	51 by 14	1,066	29.1	....	45	22.7	19.4	85.5	5,691	....
June 1	S. C. 12/37	58 by 14	940	22.6	.6	49.5	22.8	20.8	91.2	6,581	3,156
	S. C. 14/7	36 by 14	360	13.9	8.1	47	19.5	15.5	79.5	2,270	1,155
	Ribbon	24 by 14	370	22	....	44	20.5	15.8	77	3,425	....
	B. 6032	30 by 14	470	21.8	2.2	43	19.5	15.9	81.5	3,340	1,353
	Ribbon	27 by 14	460	24	....	45	22.7	19.4	85.5	4,693	....
	B. H. 10/12	47 by 14	650	19	1.2	44	23.8	21	88.2	3,932	109
2	S. C. 12/37	300 by 14	6,334	29.4	9.2	49.5	22.8	15.4	67.5	5,018	1,195
	Crystallina	124 by 14	1,920	21.5	1.3	40	21.5	16.7	77.7	3,217	606
	Ribbon	244 by 14	3,530	20.2	....	44	21.8	19.2	88.1	3,823	....
	S. C. 14/7	182 by 14	1,330	10.1	11.3	48	19.5	16.6	85.1	1,803	1,720
	Ribbon	273 by 14	4,210	21.4	....	44	21.5	16.7	77.7	3,523	....
4	S. C. 12/37	340 by 14	5,688	23.4	3.4	43	21.7	19.9	91.7	4,487	675
	do	462 by 14	8,230	24.6	4.6	43	21.7	19.9	91.7	4,717	905
11	Ribbon	266 by 14	3,740	20	....	43	21.8	19.8	90.8	3,812	....

In considering these results, it should be noted that the cane variety of each plat is compared with a plat of Ribbon cane growing alongside or near by. The result of the Ribbon plat, with which each plat is compared, is placed immediately below the result of the variety, except in the few cases where there was no Ribbon plat immediately alongside. In this case each variety is compared with the nearest Ribbon plat.

The analytical results were obtained by crushing a sample of from 50 to 100 pounds of cane in a small three-roller mill driven by a five-horsepower gasoline engine. This mill has given poor results in crushing. However, inasmuch as all the samples were crushed in the same mill, the results are comparable. In considering the yield of sucrose per acre extracted by the small mill, showing the increase or decrease compared with the standard cane growing alongside, the inferior work of the laboratory mill in extracting must be borne in mind. This increase or decrease would be much greater in a modern sugar factory. To determine the results obtainable had a proper mill been used it would be necessary to add at least 50 per cent to these figures.

Large increases in tons of cane and in sucrose per acre have been given by seedling canes S. C. 12/37, S. C. 12/4, S. C. 14/93, S. C. 13/13, B. 3412, B. 16536, B. 4596, B. 6388, and B. H. 10/12. In the case of the St. Croix seedlings, the experiments were repeated in several plats; and the results are, consequently, more accurate than those obtained from the Barbados seedlings, which were tried in one or two plats only. The results of all the plats of the best of the St. Croix varieties of cane are given below:

Comparison of yield obtained from seedling cane S. C. 12/37 and Ribbon.

Plat number.	Variety.			
	S. C. 12/37.		Ribbon.	
	Cane per acre.	Sucrose per acre.	Cane per acre.	Sucrose per acre.
	Tons.	*Pounds.*	*Tons.*	*Pounds.*
1	33.0	6,387	36.1	6,971
2	41.3	8,705	43	8,842
3	50.5	11,312	39	7,487
4	49.5	10,976	18.6	2,971
5	51.5	9,504	17.7	3,394
6	31.5	6,915	29.1	5,691
7	22.6	6,581	22	3,425
8	29.4	5,018	20.2	3,823
9	23.4	4,487	20	3,812
10	24.6	4,717	....	....
Total	357.3	74,602	245.7	46,416
Average	35.7	7,460	27.3	5,157

Seedling S. C. 12/37.—This variety has given an average increase per acre over the Ribbon cane of 8.4 tons of cane and 2,303 pounds of sucrose extracted by the small laboratory mill. The tonnage represents an increase of approximately 31 per cent, and the sucrose an increase of approximately 45 per cent. In actual mill practice the increase in sucrose per acre would be about 50 per cent more; that is, in the neighborhood of 3,454 pounds per acre. The increase from substituting this cane for the standard variety Ribbon would represent a profit of $621 per acre when sugar is selling at $360 per short ton, the average price obtained this year.

No cuttings of S. C. 12/37 have as yet been distributed, but it is probable that distribution will be made in November, because it is making an excellent showing this year. This cane does best in wet weather. In dry weather it remains sound and green, but does not make so much growth as Ribbon cane. As soon as rain falls, however, it goes ahead, growing faster than Ribbon. S. C. 12/37 does not arrow, but continues to grow after the Ribbon has arrowed and ceased growing. It is very juicy, the juice being rich and pure. Moreover, it is very healthy and almost immune to *Marasmius sacchari*. Cane S. C. 12/37 can now be confidently recommended.

Comparison of yields obtained from seedling cane S. C. 12/4 and Ribbon.

Plat number.	Variety.			
	S. C. 12/4.		Ribbon.	
	Cane per acre.	Sucrose per acre.	Cane per acre.	Sucrose per acre.
	Tons.	*Pounds.*	*Tons.*	*Pounds.*
1	34	8,873	27.3	5,797
2	38.4	8,790	32	6,521
3	29.4	6,322	31.2	6,360
4	30.7	5,756	18.3	3,524
5	25	5,107	32	6,659
Total	157.5	34,848	140.8	28,861
Average	31.5	6,969	28.1	5,772

Seedling S. C. 12/4.—This cane has given an average increase per acre over the Ribbon cane of 3.4 tons of cane and 1,197 pounds of sucrose extracted by the small mill. The tonnage represents an increase of approximately 12 per cent, and the sucrose an increase of approximately 20 per cent. In actual mill practice the increase per acre would be about 50 per cent more; that is, in the neighborhood of 1,800 pounds per acre. The increase from substituting this cane for the standard variety Ribbon, would represent a profit of $324 per acre when sugar is selling at $360 per short ton.

Cane S. C. 12/4 has continued to give good results on the plantations, and over 100 acres of it are now under cultivation in St. Croix. (Pl. III, figs. 1 and 2.) The Mount Pleasant plantation reported an increase of 30 per cent in tons of cane per acre for first ratoons. Definite results from other plantations were not obtained, but it is known that this cane has shown its superiority everywhere, the exceptional richness and purity of the juice being an important point in its favor.

It was observed that this cane dried up more rapidly than Ribbon cane when subjected to severe drought. For this reason it should be cut earlier in the season than Ribbon cane, if there is dry weather. This year some of the plantations delayed cutting S. C. 12/4 in order to use the top pieces for planting at the time of the spring rains. These rains did not occur; consequently, the canes became overripe and no cuttings could be obtained. On this account the propagation of the cane received a setback this year. In 1920 at least 42,000 cuttings of this cane were distributed from the experiment station. The Mercedita plantation in Porto Rico is now growing about 30 acres of S. C. 12/4 cane that looks remarkably good.

Comparison of yields obtained from seedling cane S. C. 14/93 and Ribbon.

Plat number.	Variety.			
	S. C. 14/93.		Ribbon.	
	Cane per acre.	Sucrose per acre.	Cane per acre.	Sucrose per acre.
	Tons.	*Pounds.*	*Tons.*	*Pounds.*
1	30	5,416	31.5	5,306
2	43.9	7,926		
Total	73.9	13,342	31.5	5,306
Average	36.9	6,671		

Seedling S. C. 14/93.—This cane is one of the newer seedlings of promise. It has given an increase of 5.4 tons of cane and 1,365 pounds of sucrose per acre above the standard variety. The addition of 50 per cent to the sucrose to obtain the amount that would be extracted by a well-equipped mill shows an increase of 2,047 pounds per acre over that given by the standard variety. This would mean a profit of about $375 per acre were S. C. 14/93 substituted for Ribbon.

Comparison of yields obtained from seedling cane S. C. 13/13 and Ribbon.

Plat number.	Variety.			
	S. C. 13/13.		Ribbon.	
	Cane per acre.	Sucrose per acre.	Cane per acre.	Sucrose per acre.
	Tons.	*Pounds.*	*Tons.*	*Pounds.*
1	39	7,024	28	5,594
2	35	6,304	39	7,487
3	33.5	5,798	36	6,919
4	37	6,404	31	6,693
5	40	6,577	39	7,487
6	40.2	6,690	27	5,345
7	49	8,155	25	4,211
8	53	8,821		
9	45	7,026		
10	45	7,056		
11	34	5,331		
12	44.6	7,223		
13	31	5,652		
14	25	4,413		
15	24.7	4,360		
Total	576.0	96,834	225.0	43,736
Average	38.4	6,455	32.1	6,248

Seedling S. C. 13/13.—This cane has given an average increase of 6.3 tons of cane but only 207 pounds of sucrose per acre extracted by the small mill. The comparatively small increase in sucrose is due to the high fiber content of the cane. This variety produces good tonnage and good juice, is exceptionally free from Marasmius, and only slightly attacked by moth borer. Cuttings of cane S. C. 13/13 will be distributed in November.

The following table gives the results of experiments with cane planted in field No. 7 in August, 1918, and harvested in October, 1919, but does not show the analytical results because the canes were not ripe. After the canes were cut into pieces for planting, cuttings of the best varieties were distributed for trial to estates (plantations) in the island.

Comparative test of cane varieties planted in field No. 7.

Name of cane.	Number of plats harvested.	Average yield per acre.	Number of cuttings distributed.	Name of place where cuttings were sent.
		Tons.		
B. H. 10/12	1	53	600	Experiment station.
S. C. 14/93	2	51	400 2,700	Anguilla plantation. Hogensborg plantation.
S. C. 14/7	1	49	830	Do.
Japanese	1	48	80,000 8,000 4,000 2,000 2,000	Porto Rico. Jerusalem plantation. Colquhoun plantation. Anguilla plantation. Golden Grove plantation.
S. C. 15/50	1	46	775	Do.
S. C. 14/52	1	45	400	Hogensborg plantation.
S. C. 14/90	1	43	1,000	Do.
Ribbon	5	41.3	3,000	Golden Grove plantation.
S. C. 12/7	4	40.2	2,800	Betty's Hope plantation.
S. C. 15/86	4	40	800 1,200	Anguilla plantation. William's Delight plantation.
S. C. 15/51	1	40	1,025	St. George's plantation.
S. C. 15/50	2	40	....	
S. C. 13/42	1	38	....	
S. C. 14/19	1	37.3	225	Betty's Hope plantation.
S. C. 13/13	6	35.3	1,555	Hogensborg plantation.
Do	....	....	1,270	Golden Grove plantation.
S. C. 12/46	1	34	....	Experiment station.
S. C. 14/74	1	32.5	....	Do.
S. C. 15/77	1	31	1,700	Golden Grove plantation.
S. C. 13/3	2	29.5	600	Do.
S. C. 13/7	....	29.2	890	Betty's Hope plantation.
S. C. 14/21	1	29	....	
S. C. 15/53	1	28	....	
S. C. 15/3	4	27	....	
S. C. 15/1	2	26.3	....	
S. C. 14/107	1	26.2	....	
S. C. 15/79	1	21	....	
S. C. 15/23	1	19	....	

CONTROL OF SOIL GRUBS IN CANE CULTIVATION.

At Betty's Hope plantation a field was laid out in alternate plats, treated and untreated. Handfuls of poisoned bagasse were added to the manure which was applied to the treated plats. The bagasse was laid in the manure furrows at distances of 6 feet apart, the poison consisting of 3 parts of Paris green to 100 parts of bagasse. This experiment was started in November, 1919, and the results will not be ready for publication until the field is harvested in 1921.

THE SEA ISLAND COTTON INDUSTRY.

This industry was not extended during the past year. Approximately only 180 acres were planted to cotton. The yields were not so good as last year, the average being approximately 600 pounds of seed cotton per acre for 1920. Some fields yielded 1,000 pounds per acre, and in one instance only 200 pounds per acre was obtained. This was due to an early outbreak of blister mite (*Eriophyes gossypii*) in the field. The outbreak was the result of imperfect uprooting and burning of the old cotton in a neighboring field. Too much stress can not be laid on the necessity of thoroughly carrying out the cotton-pest law.[1]

Last year the average yield per acre was over 1,000 pounds of seed cotton. During 1918–19, 92,613 pounds of Sea Island cotton were exported from St. Croix. The larger yield of last year was due to better weather conditions. The lint of St. Croix sea-island cotton is excellent. This year it brought from $1.80 to $2 a pound in the Liverpool markets.

The station continued its experiment work in cotton breeding. During the year 130 variety plats were cultivated, and records of cotton yield, quality, and freedom from pests were kept. Progress has been made along two lines, namely, (1) increase in yield of lint of good quality, and (2) freedom from blister mite. One variety showed practically complete immunity to this pest. The plats were small, consisting for the most part of 25 to 50 hills. Some larger plats having from 100 to 400 hills were also grown to cotton.

The largest yield obtained was at the rate of 4,450 pounds of seed cotton per acre, individual plants in this plat giving over 2 pounds of seed cotton each. The lint length of this variety was 1¾ inches, and was reported by the Bureau of Markets, United States Department of Agriculture, as being strong and silky, but irregular in length. The second largest yield was 2,862 pounds. The lint length of this cotton was 1.8 inches, and the plants were only slightly attacked by blister mite. The third largest yield was at the rate of 2,724 pounds per acre, the lint of this cotton being 2 inches in length, strong, and of fine quality. The plants, however, were much attacked by blister mite. Sixteen of the plats produced over 2,000 pounds of seed cotton per acre, and only 15 plats fell below 1,000 pounds per acre.

CORN.

During the year experiments in corn breeding were continued and the improvement of both yellow and white varieties of local corn by the ear-to-row method was furthered. (Pl. II, fig. 2.) The experiments were conducted this year at Upper Love plantation in cooperation with the Danish West India Sugar Factory Co. Though 60 rows were planted, only 29 were harvested and weighed separately. The rows were 700 feet long and 4 feet apart. The table following gives the results obtained.

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[1] A law passed in the colonial council calls for a closed season for cotton of 1 month in each year. All cotton plants in the island must be uprooted and burned by a certain date fixed each year by the regularly appointed commission, and no planting of cotton is to take place prior to the lapse of 4 weeks from that date.

Results of experiments with corn at the Upper Love plantation.

Row number.	Weight of dried husked corn.	Row number.	Weight of dried husked corn.	Row number.	Weight of dried husked corn.
	Pounds.		*Pounds.*		*Pounds.*
1	106	11	124	21	117
2	137	12	119	22	110
3	109	13	128	23	114
4	110	14	124	24	136
5	117	15	117	25	117
6	113	16	110	26	107
7	133	17	120	27	109
8	129	18	108	28	127
9	111	19	137	29	111
10	119	20	118		

The best results were obtained from rows Nos. 2, 7, 19, and 24; consequently the best ears were selected from them for further work next season. One hundred and thirty-seven pounds of dried shelled corn per row is equal to 2,137 pounds per acre; and since corn is locally sold at 5 cents a pound, it can readily be understood why the cultivation is a profitable one.

WORK IN CROSS BREEDING.

Experiments begun last year in crossing improved local corn with Black Mexican sweet corn were continued. Two sets of plantings were made, seed of the second and third generations being used. Some ears of pure purple black color were obtained from the third generation seed. These will be tested again during the coming season. A great variety of colors of corn, including bewildering shades of black, purple, lilac, pink, red, and chocolate, many showing various degrees of transparency and beauty, have been produced from these experiments.

Hopi corn was grown at the station during the year, and crossings of this variety were tried with improved local corn. Some of the first generation seed that has been produced will be tested during the coming season. The object of this experiment is to produce a good yielding corn which can be planted a foot or more deep without hindering the seedlings from reaching the surface. This deep planting should enable the corn to withstand dry weather better than the ordinary method of planting.

LEGUMINOUS CROPS.

Experiments with legumes for grain and green-manuring purposes were carried on during the year, and some trials with legumes for the production of string beans were made. The best results for green-manuring purposes were again obtained from the velvet and Lyon beans. Sword beans (*Canavalia gladiata*) gave very good results also.

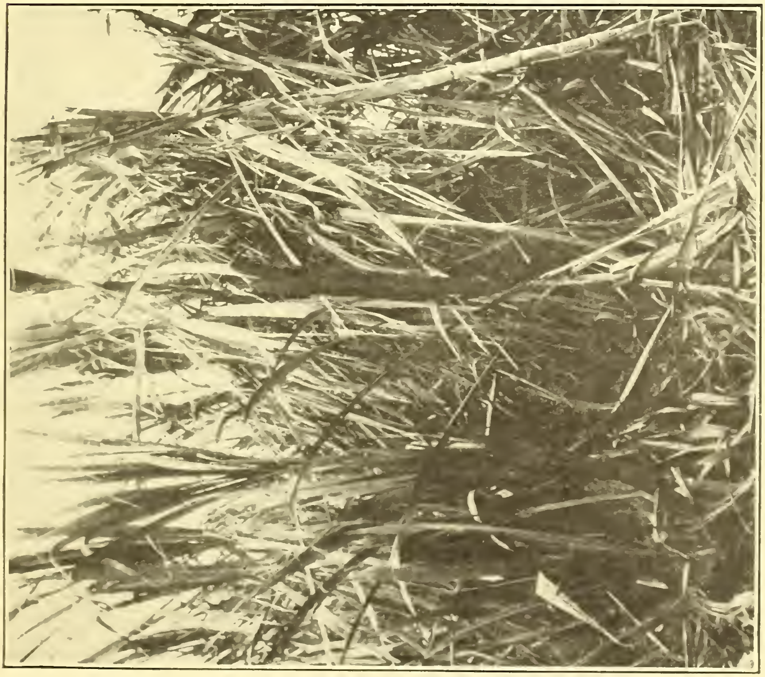

FIG. 1.—FIELD OF S. C. 12/4 CANE.

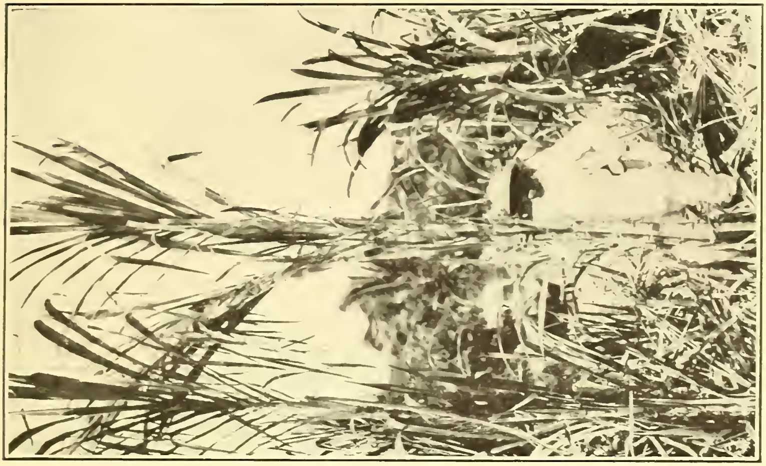

FIG. 2.—SINGLE STALK OF S. C. 12/4 CANE, GROWN ON ST. JOHN'S PLANTATION, ST. CROIX.

PLATE IV.

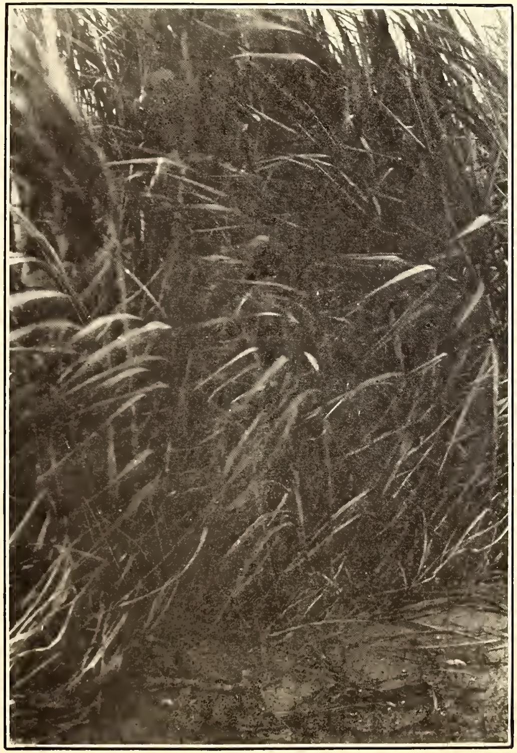

FIG. I.—ELEPHANT OR NAPIER GRASS, PENNISETUM PURPUREUM.

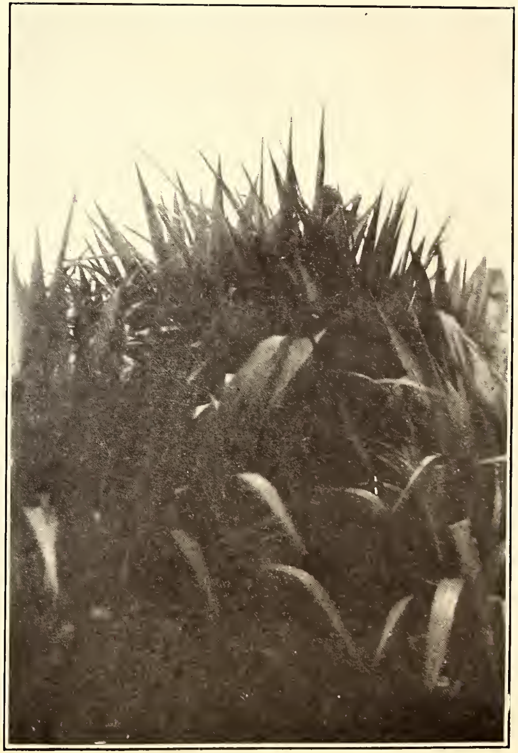

FIG. 2.—GUATEMALA GRASS, TRIPSACUM LAXUM.

NEW FORAGE PLANTS FOR VIRGIN ISLANDS.

Seed of these varieties was distributed to several plantations. No variety of edible legume was found to give satisfactory results as a grain crop. The yield of the best varieties was poor, being not more than 100 pounds to the acre. Black Venezuelan bean gave the best returns. The poor yield was due to the susceptibility of all the varieties to a kind of anthracnose which apparently is spread by the green stink bug (*Nezara viridula*). Among the varieties tried for the production of string beans, Longfellow Six Weeks and Madagascar gave the best returns. One plat of Longfellow Six Weeks, 27 by 8 feet, produced 22 pounds of string beans.

SWEET POTATOES.

During the year two experiments were made with sweet potatoes, the first in an effort to control the sweet-potato weevil (*Euscepes batatæ*) and the second to determine the effect of farmyard manure on the yield of potatoes.

The sweet-potato weevil was brought under control by dipping the cuttings of the plants in kerosene-fusel oil emulsion immediately before planting them in order to kill any eggs laid on the vines. Much difference was found between the plats of treated and untreated vines. The entomologist estimated the amount of infestation in treated vines to be only 10 per cent and that in untreated vines to be 90 per cent. As this method of control is not only cheap but easy to apply, it is recommended whenever pieces of sweet-potato vines are planted.

In the second experiment with sweet potatoes, farmyard manure was applied to the test plats at the rate of approximately 20 tons to the acre. The variety of sweet potato planted was the Black Rock. The manured plats gave only half the yield of potatoes produced by the unmanured plats. The average yield of potatoes obtained from the untreated plats planted to cuttings that were given the kerosene-fusel oil emulsion treatment prior to planting was at the rate of 13,360 pounds to the acre.

GRASSES.

As a result of the increasing importance of the live-stock industry in the Virgin Islands, experiments in the introduction of new and valuable fodder grasses are receiving special attention.

Over 150,000 cuttings of Napier or elephant grass (*Pennisetum purpureum*) (Pl. IV, fig. 1), which was introduced last year, have been distributed and found to give good results. Napier grass resists drought better than any other grass in these islands and gives much larger yields.

Guatemala grass (*Tripsacum laxum*) (Pl. IV, fig. 2), introduced into the Virgin Islands about two years ago, has proved excellent as a drought resistant. The yield, however, is small compared with that of Napier grass.

THE CATTLE INDUSTRY OF ST. CROIX.

The cattle-raising industry was greatly stimulated during the year by the demand for meat from Porto Rico and by prevailing high prices, the cattle bringing from 8 to 10 cents a pound live weight. However, the severe drought, which lasted from February to the end of June, caused considerable losses among the animals. Until the cattle and dairy farmers realize the necessity of erecting silos, this industry will not be placed on the sound footing it deserves. Elephant grass, corn, sorghum, and velvet beans could readily be raised for use as silage during the wet season. The experiment station staff has tried to impress upon cattle raisers the necessity of keeping their stock free from ticks (*Margaropus annulatus*). A cattle-dipping vat was erected at the station last July, and invitations were issued to all stock raisers in the island to attend the opening demonstration. While the station cattle were being passed through the dipping vat a lecture was given by the writer, and the dip was declared open for use without charge to anyone desiring to send in his stock for dipping. Up to the time of writing no one has taken advantage of this opportunity. A few of the cattle raisers have purchased spraying outfits and are now spraying their stock.

EXPERIMENTS WITH TRUCK CROPS.

Vegetable growing is much neglected in the Virgin Islands. This is largely due to the uncertain and scanty rainfall. Although the climate is admittedly a great handicap, very much more could be done to grow vegetables at a profit. Very good results were obtained with tomatoes at the experiment station last year, the varieties Ponderosa and Chalk's Early Jewel doing unusually well. String beans can be very profitably cultivated in St. Croix. A plat only 27 by 8 feet planted to the Longfellow Six Weeks variety produced 22 pounds of string beans. These sell in the local market at 10 cents a pound. Carrots grow excellently and resist dry weather. Cabbage also withstands dry weather. Kohl-rabi, especially the Early White Vienna variety, does excellently, and needs only the natural rainfall. Onions of the Bermuda type grow splendidly and well withstand dry weather. The beet is an uncertain crop, because it severely suffers at times from the webworm (*Pachyzancla bipunctalis*). Melons and cucumbers were tried at the station several times but without success, as they were invariably destroyed by the melon worm (*Diaphania hyalinata*).

Greater quantities of staple tropical vegetables, such as sweet potatoes, yams, eddoes or yautia, and okra, should be grown. A good profit is certain to accrue to anyone taking up the cultivation of these vegetables in a businesslike and scientific manner.

FRUIT GROWING.

While the Virgin Islands are not adapted to the raising of fruit for export, there is no reason why they should not produce enough fruit for local consumption. Some excellent oranges and avocados are produced in the neighborhood of the Annaly and Mount Stewart plantations in St. Croix. Prædial larceny is at present a great drawback to the extension of this kind of cultivation.

A lime orchard established several years ago at the experiment station is doing fairly well. Some buds of orange and grapefruit that were inserted in a few of these trees are growing nicely. A number of young avocado, mango, and guava trees were planted out during the year, and a regular fruit orchard, protected by windbreaks, will be started during the coming season to show what can be done in the way of raising fruit. A large number of papaya trees were also planted, the seed of which was obtained from Hawaii and Samoa. Six pineapple slips were obtained from Samoa and planted in boxes filled with soil free from carbonate of lime.

THE CASTOR-OIL PLANT.

During 1918 some seed of the castor-oil plant was imported by the experiment station from Porto Rico, whither it was brought from Santo Domingo. It was planted in a 5-acre field at the Enfield Green plantation in St. Croix. The plants grew well, but the stand was irregular and records of yield were not kept. The writer selected seed from four plants and placed it in four rows, one selection being planted in each row. The rows were 300 feet long and 6 feet apart. Three of the rows were planted in August, 1919, and one row was planted in November, 1919. The first harvesting of castor-oil seeds was made early in June. The following table shows the results obtained after the seed was dried and shelled:

Yield of castor-oil seed.

Row number.	Selection No.	Seed produced per row.	Seed produced per acre.
		Pounds.	*Pounds.*
1	1	107	2,570
2	2	49	1,083
3	3	112	2,690
4	4	(1)	....

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[1] Selection No. 4 was planted in November and has not yet been harvested.

COCONUTS.

In the last annual report mention was made of the coconuts that were planted among canes in one of the fields of the experiment station. These coconut trees are making good growth and at the same time the field is producing a fair crop of ratoon canes. The method of gradually changing the cultivation from canes to coconuts is practicable and likely to be profitable if labor continues scarce and expensive.

REPORT OF THE ENTOMOLOGIST.

C. E. Wilson.

During the year the entomologist devoted a large part of his time to collecting and controlling field insect pests, and to studying carefully the various scale insects and their host plants found on the islands. Specimens of scale insects were submitted for examination to Harold Morrison of the Bureau of Entomology, United States Department of Agriculture, and other specimens were referred to L. O. Howard, chief of that bureau.

SCALE INSECTS.

Collections of scale insects were made on the islands of St. Croix, St. John, and St. Thomas, each species in the list below bearing the name of the locality or plantation from which it came. In an effort to give a complete list of the plants acting as hosts for the various species of scales found in these islands, the following table has been prepared.[2]

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[2] Both local and scientific names are given for the host plants when possible. The names of the host plants were taken from the Flora of St. Croix and the Virgin Islands, by Baron H. F. A. Eggers, and the Flora of the British West Indian Islands, by A. H. R. Grisebach.

Scale insects and their host plants found in the Virgin Islands.

Scientific name.	Common name.	Host plants.	Where obtained.		
			St. Croix.	St. John.	St. Thomas.
Subfamily MONOPHLEBINÆ:					
Palæococcus rosæ	The rose palæococcus	Cashá (*Acacia farnesiana*), turpentine tree (*Bursera gummifera*).	Shoys plantation	Dennis Bay, Coral Bay.	Sugar plantation, Mosquito Bay.
Subfamily ORTHEZIINÆ:					
Orthezia prælonga	Croton orthezia	*Acalypha* sp., *Croton* sp., eggplant (*Solanum melongena*), lime (*Citrus aurantium* var.), orange (*C. aurantium*), sand-box tree (*Hura crepitans*), sugar apple (*Anona squamosa*), tomato (*Lycopersicum* sp.).	Annaly plantation, Christiansted, Frederiksted, experiment station, Shoys plantation.	Dennis Bay, Cruz Bay.	Public park, Mosquito Bay, sugar plantation.
Subfamily CONCHASPINÆ:					
Conchaspis angræci		Angelica (*Sciadophyllum* sp.), *Croton* sp., *Hibiscus* sp., manchineel tree (*Hippomane mancinella*), sage (*Lantana camara*).	Annaly plantation, Christiansted, experiment station, Frederiksted, Granard plantation, Longford plantation.	Cruz Bay, Dennis Bay.	Charlotte Amalie.
Subfamily DACTYLOPIINÆ:					
Asterolecanium bambusæ	Bamboo scale	Bamboo (*Bambusa vulgaris*)	Canaan plantation, experiment station.	Adrian plantation.	
A. pustulans	Pustule scale	*Acacia* sp., *Bougainvillea* sp., cotton (*Gossypium* sp.), *Crotalaria* sp., fig (*Ficus carica*), native fig (*F. pedunculata*), governor plum (*Flacourtia ramontchi*), mango (*Mangifera indica*), nettle (*Tragia volubilis*), oleander (*Nerium* sp.), pigeon pea (*Cajanus indicus*), pain-killer (*Morinda citrifolia*), sapodilla or mespel (*Sapota achras*), soursop (*Anona muricata*), sugar apple (*A. squamosa*), thibet tree (*Acacia lebbek*), *Tecoma grandis*, tomato (*Lycopersicum* sp.), willow (*Salix* sp.), wild tamarind (*Leucæna glauca*), yam (*Dioscorea* sp.).	Anguilla plantation, Annaly plantation, Christiansted, experiment station, Frederiksted, Shoys plantation.	Adrian plantation, Coral Bay, Dennis Bay.	Charlotte Amalie, Mosquito Bay, sugar plantation.
Pseudococcus bromeliæ	Pineapple mealy bug	Sapodilla or mespel (*Sapota achras*)	Experiment station		
P. calceolariæ		Sugar cane (*Saccharum officinarum*)	do		
P. citri	Common mealy bug	Roots of corn (*Zea mays*), lime (*C. aurantium* var.).	Christiansted, experiment station.		

Scale insects and their host plants found in the Virgin Islands—Continued.

Scientific name.	Common name.	Host plants.	Where obtained.		
			St. Croix.	St. John.	St. Thomas.
Subfamily DACTYLOPIINÆ—Continued.					
P. nipæ	Coconut mealy bug	Banana (*Musa sapientum*), coconut palm (*Cocos nucifera*), date palm (*Phœnix dactylifera*), guava (*Psidium guava*), keneppy tree (*Melicocca bijuga*), mountain cabbage or cabbage palm (*Oreodoxa regia*), red manjack (*Cordia sebestana* var. *rubra*), screw pine (*Pandanus odoratissimus*), star apple (*Chrysophyllum cainito*).	Christiansted, Frederiksted, Friedensborg plantation, experiment station.	Coral Bay, Dennis Bay, Reef Bay.	Charlotte Amalie, Mosquito Bay, sugar plantation.
P. sacchari	Sugar-cane mealy bug	Sugar cane (*Saccharum officinarum*)	Experiment station		Mosquito Bay.
P. virgatus	Spotted mealy bug	*Acalypha* sp., bean roots (*Phaseolus* sp.), *Bignonia* sp., coral bush (*Jatropha multifida*), *Croton* sp., *Coleus* sp., *Drosera* sp., eggplant (*Solanum melongena*), okra (*Abelmoschus esculentus*), tomato (*Lycopersicum* sp.), yam vines (*Dioscorea* sp.).	Christiansted, experiment station, Frederiksted.	Dennis Bay	Charlotte Amalie.
Subfamily COCCINÆ:					
Protopulvinaria pyriformis	Pyriform scale	Orchid (*Epidendrum* sp.)	Christiansted		
Pulvinaria psidii	Green shield scale	*Croton* sp., guava (*Psidium guava*), lime (*Citrus aurantium* var.), mango (*Mangifera indica*), painkiller (*Morinda citrifolia*), sea grape (*Coccoloba laurifolia*), star apple (*Chrysophyllum cainito*).	Anguilla plantation, Annaly plantation, Canaan plantation.	Cruz Bay, Coral Bay, Dennis Bay.	Charlotte Amalie, Mosquito Bay, sugar plantation.
P. yrbicola		Sweet potato (*Ipomœa batatæ*), tomato (*Lycopersicum* sp.), yam vine (*Dioscorea* sp.).	Grange plantation		
Ceroplastes cirripediformis.	Barnacle scale	Banana (*Musa sapientum*), guava (*Psidium guava*).	Experiment station		
C. denudatus	Pink wax scale	Avocado (*Persea gratissima*), guava (*Psidium guava*), keneppy tree (*Melicocca bijuga*), lime (*Citrus aurantium* var.), mango (*Mangifera indica*), native fig (*Ficus pedunculata*), orchid *Epidendrum* sp.), palms, sapodilla or mespel (*Sapota achras*), soursop (*Anona muricata*), sugar apple (*A. squamosa*), *Tecoma grandis*, white manjack (*Cordia alba*).	Annaly plantation, Christiansted, experiment station, Frederiksted.	Adrian plantation, Coral Bay, Dennis Bay.	Charlotte Amalie, Mosquito Bay.
C. floridensis	Florida wax scale	Avocado (*Persea gratissima*), bay tree (*Pimenta acris*), cashew (*Anacardium occidentale*), *Cryptostegia* sp., fern (*Nephrolepsis exaltata*), *Ficus elastica*, *F. benjamina*, guava (*Psidium guava*), keneppy tree (*Melicocca bijuga*), lime (*C. aurantium* var.), mango (*Mangifera indica*), rose (*Rosa* sp.), sea grape (*Coccoloba laurifolia*), screw pine (*Pandanus odoratissimus*), *Tecoma grandis*	Anguilla plantation, Christiansted, East Hill school, experiment station, Frederiksted, Granard plantation, South Gate farm plantation.	Coral Bay, Cruz Bay, Dennis Bay, Reef Bay.	Charlotte Amalie, Mosquito Bay, sugar plantation.

Ceroplastes sp.		Sweet scent (*Pluchea odorata*), turpentine tree (*Bursera gumifera*).	Anguilla plantation, experiment station, Shoys plantation.		Mosquito Bay.
Vinsonia[1] *stellifera*	Glassy star scale	Mango (*Mangifera indica*), mountain cabbage or cabbage palm (*Oreodoxa regia*), orchid (*Epidendrum* sp.).	Annaly plantation, Christiansted, experiment station.	Adrian plantation.	Charlotte Amalie, Mosquito Bay.
Eucalymnatus tessellatus	Tesselated shield scale	Cana, teyer-tree (*Thrinax argentea*).	Christiansted		Charlotte Amelie.
Coccus hesperidum	Soft brown scale	Avocado (*Persea gratissima*), fern (*Nephrolepsis exaltata bostoniensis*), guava (*Psidium guava*), limes (*Citrus aurantium* var.), oleander (*Nerium* sp.), papaya (*Carica papaya*).	Annaly plantation, experiment station, Frederiksted.		
Coccus mangiferæ[2]	Mango shield scale	Guava (*Psidium guava*), mango (*Mangifera indica*), soursop (*Anona muricata*).	Christiansted, Annaly plantation, experiment station.	Adrian plantation, Coral Bay, Dennis Bay.	Charlotte Amalie, Mosquito Bay.
C. viridis	Green scale	Red manjack (*Cordia sebestana* var. *rubra*), sapodilla or mespel (*Sapota achras*).	Experiment station		Sugar plantation.
Saissetia hemisphærica	Hemispherical scale	Balsam, castor bean (*Ricinus communis*), fig (*Ficus carica*), native fig (*F. pedunculata*), guava (*Psidium guava*), lime (*Citrus aurantium* var.), mango (*Mangifera indica*), nettle (*Tragia volubilis*), oleander (*Nerium* sp.), papaya (*Carica papaya*), pigeon pea (*Cajanus indicus*), soursop (*Anona muricata*), star apple (*Chrysophyllum cainito*), sugar apple (*Anona squamosa*), thibet-tree (*Acacia lebbek*), *Tecoma grandis*, white manjack (*Cordia alba*).	Anguilla plantation, Annaly plantation, Christiansted, experiment station, Frederiksted, Granard plantation, Longford plantation, Shoys plantation.	Adrian plantation, Cruz Bay, Coral Bay, Dennis Bay, Reef Bay.	Charlotte Amalie, Mosquito Bay, Sugar plantation.
S. nigra	Black shield scale	Banana (*Musa sapientum*), castor bean (*Ricinus communis*), cotton (*Gossypium* sp.), fig (*Ficus carica*), *F. benjamina*, guava (*Psidium guava*), lime (*Citrus aurantium* var.), native fig (*Ficus pedunculata*) papaya (*Carica papaya*), pepper (*Capsicum annuum*), white manjack (*Cordia alba*).	Annaly plantation, Christiansted, experiment station, Frederiksted, Grange plantation, Longford plantation, Peter's Rest plantation, Shoys plantation.	Adrian plantation, Coral Bay, Cruz Bay, Dennis Bay, Reef Bay.	Do.
Saissetia oleæ	Black scale	Almond tree (*Terminalia catappa*), avocado (*Persea gratissima*), balsam, banana (*Musa sapientum*), *Croton* sp., cotton (*Gossypium* sp.), castor-bean (*Ricinus communis*), coconut palm (*Cocos nucifera*), *Ficus benjamina*, fig (*F. carica*), guava (*Psidium guava*), *Hibiscus* sp., lime (*Citrus aurantium* var.), mango (*Mangifera indica*), native fig (*F. pedunculata*), oleander (*Nerium* sp.), okra (*Abelmoschus esculentus*), orchid (*Epidendrum* sp.), pigeon pea (*Cajanus indicus*), sapodilla or mespel (*Sapota achras*), soursop (*Anona muricata*), sugar apple (*A. squamosa*), star apple (*Chrysophyllum cainito*), *Tecoma grandis*, white manjack (*Cordia alba*).	Anguilla plantation, Annaly plantation, Christiansted, experiment station, Frederiksted, Granard plantation, Longford plantation, Shoys plantation.	Adrian plantation, Coral Bay, Cruz Bay, Dennis Bay, Reef Bay.	Do.

[1] In all places a fungus (*Cephalosporium lecanii*) was found attacking this scale.

[2] All specimens obtained showed infestation with a fungus (*Cephalosporium lecanii*).

Scale insects and their host plants found in the Virgin Islands—Continued.

Scientific name.	Common name.	Host plants.	Where obtained.		
			St. Croix.	St. John.	St. Thomas.
Subfamily DIASPINÆ:					
Chionaspis citri	Snow scale, or orange Chionaspis.	Lime (*C. aurantium* var.), pepper (*Capsicum annuum*).	Annaly plantation, Christiansted, experiment station, Frederiksted, Shoys plantation.	Coral Bay, Dennis Bay.	Charlotte Amalie, sugar plantation.
Howardia biclavis	Mining scale	Double jassamine (*Nyctanthes sambac*)			Charlotte Amalie.
Diaspis boisduvalii	Boisduval's scale, or coconut snow scale.	Banana (*Musa sapientum*), cabbage palm or mountain cabbage (*Oreodoxa regia*), coconut palm (*Cocos nucifera*).	Christiansted, experiment station, Frederiksted.	Cruz Bay, Dennis Bay.	Charlotte Amalie, Mosquito Bay.
D. echinocacti opuntiæ	Cactus scale	Cactus (*Opuntia curassavica* and other species)	All parts	All parts	All parts.
Aulacaspis pentagona	West Indian, or white peach scale.	Banana (*Musa sapientum*), cotton (*Gossypium* sp.), castor-bean (*Ricinus communis*), fig (*Ficus carica*), guava (*Psidium guava*), mulberry (*Morus* sp.), native fig (*Ficus pedunculata*), oleander (*Nerium* sp.), Otaheite-tree (*Thespesia populnea*), okra (*Abelmoschus esculentus*), papaya (*Carica papaya*), pepper (*Capiscum annuum*), *Tecoma grandis*, thibet-tree (*Acacia lebbek*), tomato, soy bean, willow (*Salix* sp.), white manjack (*Cordia alba*).	Anguilla plantation, Annaly plantation, experiment station, Frederiksted, Granard plantation, Longford plantation, Shoys plantation.	Cruz Bay, Dennis Bay.	Generally distributed.
Hemichionaspis aspidistræ	Aspidistra scale	Boston fern (*Nephrolepsis exaltata bostoniensis*), pepper (*Capsicum annuum*).	Christiansted, experiment station.		Charlotte Amalie.
H. minor	Lesser snow scale	Guava (*Psidium guava*), *Hibiscus* sp., oleander (*Nerium* sp.), Otaheite-tree (*Thespesia populnea*), pepper (*Capsicum annuum*), tomato (*Lycopersicum* sp.), white maran (*Croton astroites*).	Annaly plantation, Christiansted, experiment station, Granard plantation, Longford plantation.	Dennis Bay	Charlotte Amalie, Mosquito Bay.
Aspidiotus destructor	Destructor scale	Avocado (*Persea gratissima*), almond-tree (*Terminalia catappa*), coconut palm (*Cocos nucifera*), lime (*Citrus aurantium* var.), papaya (*Carica papaya*), pain-killer (*Morinda citrifolia*), star jessamine (*Jasminum pubescens*), sugar apple (*Anona squamosa*), *Tecoma grandis*, thibet-tree (*Acacia lebbek*), yam vine (*Dioscorea* sp.).	Annaly plantation, Christiansted, experiment station, Frederiksted.	Coral Bay, Cruz Bay, Dennis Bay, Reef Bay.	Do.
A. lataniæ	Lataniæ scale	Collard, fig (*Ficus carica*), guava (*Psidium guava*), rose (*Rosa* sp.), sapodilla or mespel (*Sapota achras*).	Canaan plantation, Christiansted, experiment station, Frederiksted.		
A. perniciosus	San Jose scale	Rose (*Rosa* sp.)	Christiansted, Frederiksted		Charlotte Amalie.
Pseudaonidia sp.		Grapevine (*Vitis* sp.), and an unidentified plant.	Experiment station, Shoys plantation.		

Selenaspidus articulatus	Rufous, or West Indian red scale.	Lime (*C. aurantium spinosissima*)	Annaly plantation, experiment station.		Sugar plantation.
Chrysomphalus aonidum	Florida red scale	Grapefruit[1]			
Targionia hartii	Yam scale	Yam tubers (*Dioscorea* sp.)	Annaly plantation, experiment station, Spring Gut plantation.		In market.
T. sacchari	Sugar cane scale	Sugar cane (*Saccharum officinarum*)	Experiment station		
Lepidosaphes alba	White mussel scale	Cassava (*Manihot utilissima*), coconut palm (*Cocos nucifera*).	do	Cruz Bay	
L. beckii	Purple scale	*Croton* sp., coconut palm (*Cocos nucifera*), guava (*Psidium guava*), *Hibiscus* sp., mango (*Mangifera indica*), orange (*C. aurantium*), lime (*C. aurantium spinossissima*).	Annaly plantation, Christiansted, experiment station, Frederiksted, Shoys plantation.	Dennis Bay	Charlotte Amalie, Mosquito Bay, sugar plantation.
L. gloverii	Long scale	Banana (*Musa sapientum*), *Croton* sp., coconut palm (*Cocos nucifera*), lime (*C. aurantium spinossissima*), orange (*C. aurantium*).	Annaly plantation, Christiansted, experiment station, Frederiksted.		Charlotte Amalie.
Ischnaspis longirostris	Black thread scale	Star jessamine (*Jasminum pubescens*), screw pine (*Pandanus odoratissimus*), teyer-tree (*Thrinax argentea*).	Christiansted, Fredensfeld		Do.
Parlatoria pergandii[2]	Chaff scale	Grapefruit, orange (*C. aurantium*)	Experiment station		

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[1] Specimens of *Chrysomphalus aonidum* were collected on grapefruit received from Porto Rico.

[2] The specimens of *Parlatoria pergandii* were imported on nursery stock.

KEROSENE-FUSEL OIL EMULSION AS A CONTACT INSECTICIDE.

In his report for 1915,[3] the agronomist in charge reported on an improved insecticide emulsion which would keep indefinitely in the concentrated form without separation of kerosene, and which would also keep in the form of emulsion for a long period when diluted. This emulsion was made by dissolving 4.5 pounds of whale-oil soap in 1,000 cubic centimeters of fusel oil to which 8,000 cubic centimeters of kerosene was added. After the whale-oil soap had completely dissolved in the fusel oil the kerosene was added and the whole vigorously stirred with a wooden paddle until thoroughly emulsified. For spraying purposes the stock solution was diluted, 1 part solution being used to 10, 15, or 20 parts water.

Scales of the Dactylopiinæ and Coccinæ families were readily killed by the use of 1 part kerosene-fusel oil emulsion diluted with 15 and 20 parts water. Scales of the Diaspinæ family were likewise killed by the use of 1 part kerosene-fusel oil emulsion to 10 parts water, but the results were not entirely satisfactory owing to lack of a power spray pump.

Yam tubers that were severely infested with the yam scale (*Targionia hartii*) were planted after being immersed in a solution made up of 1 part insecticide to 10 parts water. The next crop showed very little infestation, while crops from tubers planted without this treatment were severely infested with scales.

Sweet-potato draws and cuttings, when treated with 1 part insecticide to which 10 parts water was added, showed that for early planted vines the injury, due to the West Indian sweet-potato weevil (*Euscepes batatæ*) was reduced about 75 per cent, and that for late planted vines the injury was reduced about 60 per cent.

The red-banded thrips (*Heliothrips rubrocinctus*) was found attacking young mango trees (*Mangifera indica*) but was killed when the trees were sprayed with a solution made up of 1 part of the stock insecticide to 10 parts water.

The kerosene-fusel oil emulsion has an advantage over some other contact insecticides in that it requires no heat when being mixed. The stock solution will keep indefinitely without the separation of the kerosene and fusel oil if the soap has been thoroughly dissolved in the oil before the kerosene is added. The solution can be used to advantage in the West Indies, especially in the British West Indies, where fusel oil can be obtained at a very low price from the rum stills.

INTRODUCTION OF ENTOMOGENOUS FUNGI.

The widespread and constantly increasing numbers of two species of white flies (*Aleurodicus cocois* and *Aleurothrixus floccossus*), made the use of contact insecticides impracticable at the experiment station grounds. It was therefore decided to introduce the red fungus of the white fly (*Aschersonia aleyrodis*) as a control measure. Through the courtesy of Dr. E. W. Berger, entomologist of the Florida State Plant Board, a shipment of two pure cultures of fungus (Mtz. G17) arrived in November, 1919, and the fungus was planted on coconut palms (*Cocos nucifera*) that were severely infested with *A. cocois*. In February, 1920, a shipment of three pure cultures was received. These were numbered 5664–G1, 5665–G2, and Series VII–Mtz. G17. Culture 5664–G1 was planted on coconut palms severely infested with *A. cocois*. Culture 5665–G2 was planted on banana plants (*Musa sapientum*), coconut palm (*C. nucifera*), and guava (*Psidium guava*). The banana plants and coconut palms and leaves of the almond (*Terminalia catappa*) were infested with *A. cocois* and the guava with *A. floccossus*. Culture Series VII–Mtz. G17 was planted on banana, coconut palm, and guava. Continued high winds and drought that began at the time of planting have made the introduction unsuccessful. With the establishment of windbreaks more introductions will be made.

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[3] Rpt. Agr. Expt. Sta. St. Croix, 1915, p. 30.

INSECTS OF SUGAR CANE.

Sugar cane was found infested with sugar-cane moth borer (*Diatræa saccharalis*), sugar-cane borer (*Metamasius sericeus*), cane borer (*Lagochirus araneiformis*), mealy bugs (*Pseudococcus sacchari* and *P. calceolariæ*), scale insect (*Targionia sacchari*), root grubs (*Ligyrus* sp., and *Stratægus titanus*), and shot-hole borer (*Xyleborus* sp.).

The sugar-cane moth borer (*D. saccharalis*) in the larval stage does serious damage to cane by boring into the stalk. The injury to cane by the larvæ is twofold: (1) A direct loss in sugar and a decided reduction in the purity of juice and (2) injury to the cane by the tunneling of the larvæ which permits the entrance of fungi. The larvæ are partly controlled by parasitic and predacious insects, and by an entomogenous fungus (*Cordyceps barberi*). Some other control methods recommended are (1) the planting of noninfested cuttings, (2) clean cultivation before and after planting, (3) collecting egg clusters, (4) cutting out dead hearts, and (5) burning or destroying all infested canes.

The sugar-cane pests causing the most injury to cane planted on the experiment station ground during the year were two species of beetles (*Metamasius sericeus* and *Lagochirus araneiformis*) that damaged the cane to the extent of 15 per cent. The agronomist in charge reported in 1913[4] the presence of *L. araneiformis* in cane in very limited numbers. It was not then considered a serious pest, but examination of canes during the year just passed showed the infestation at the experiment station to be 10 per cent. Canes examined from two other places in St. Croix indicated a higher percentage of infestation.

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[4] Rpt. Agr. Expt. Sta. St. Croix, 1913, p. 4.

During the year 20,193,457 pounds of sugar were exported from St. Croix at a value of $2,733,644.56 in United States currency.[5] Since Crystallina and Ribbon cane are the standard varieties grown on the island, and experimental plats planted to these varieties at the station showed a loss of 10 per cent from the ravages of *M. sericeus* and *L. araneiformis*, it is seen from the above figures that the island suffered an actual loss of 2,019,345.7 pounds of sugar, which was valued at about $27,336.45.

The following table shows the percentage of canes destroyed in each variety by the beetles *M. sericeus* and *L. araneiformis*.

Cane varieties and amount of infestation by beetles.[1]

Variety of cane.	Damage by—		Variety of cane.	Damage by—	
	Metamasius sericeus.	*Lagochirus araneiformis.*		*Metamasius sericeus.*	*Lagochirus araneiformis.*
B 3412	None	Small.	S. C. 14/19	Severe	Severe.
B 3390	General	General.	S. C. 14/20	Small	Small.
B 6388	do	Do.	S. C. 14/24	do	Do.
B 6292	do	Do.	S. C. 14/29	General	General.
B 165–32	Slight	General.	S. C. 14/30	Small	Small.
B 4596	Small	Small.	S. C. 14/46	do	General.
B 209	General	Severe.	S. C. 14/88	General	Do.
D 109	Small	Do.	S. C. 14/99	Severe	Severe.
Cane Bay Seedling	do	Small.	S. C. 14/108	General	General.
BH 1012	Slight	Do.	S. C. 14/140	Slight	Small.
Yellow Caledonia	Small	General.	S. C. 15/1	Small	Do.
B 3922	General	Severe.	S. C. 15/2	Slight	Do.
S. C. 12/3	Small	General.	S. C. 15/23	do	Do.
S. C. 12/4	Slight	Small.	S. C. 15/50	do	Do.
S. C. 12/11	Severe	Severe.	S. C. 15/54	Small	Do.
S. C. 12/37	Small	General.	S. C. 15/76	do	General.
S. C. 12/48	General	Severe.	S. C. 15/80	Slight	Small.
S. C. 13/7	Slight	Small.	Crystallina	General	General.
S. C. 13/13	Small	Do.	Ribbon	do	Do.
S. C. 14/7	do	Do.			

[1] Terms indicating the amount of damage are used in the following order of increasing damage: Slight, 0.5 to 3 per cent; small, 3 to 5 per cent; general, 5 to 10 per cent; severe, 10 to 25 per cent.

As a control measure, all dead canes are being collected and burned.

Sugar cane was also attacked by two kinds of mealy bugs (*Pseudococcus calceolariæ* and *P. sacchari*), but control measures have been found in the way of natural enemies and a parasitic fungus (probably *Aspergillus flavus*). Scale insects (*Targionia sacchari*) are often found on cane stalks, but they have not been numerous enough to cause any injury to the plants.

Root grubs (*Ligyrus* sp. and *Stratægus titanus*) often cause serious damage to cane by their attacks on cane cuttings and young canes. The root grubs are probably introduced into cane fields by bagasse and pen manure that are used for fertilizing purposes. Examination of old piles of bagasse near "Peter's Rest" plantation showed numerous grub infestation. Large collections of these grubs were also obtained from manure that was taken from pens. For control measures, poisoned bagasse has been found successful when used with Paris green, 100 parts bagasse being used to 3 parts Paris green. Handfuls of this poison were scattered every few feet in the cane rows.

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[5] Reported by collector of customs.

The shot-hole borer (*Xyleborus* sp.) is generally distributed over the island, but seems to attack only diseased canes. As a control measure, the infected canes should be collected and burned.

INSECTS OF COTTON.

When examined for insect pests, cotton, growing at the experiment station and in the cotton fields of the Golden Grove, Great Pond, Lowry Hill, and Longford plantations, was found to be attacked by (1) aphids (*Aphis gossypii*), (2) the cotton worm (*Alabama argillacea*), (3) the cotton bollworm (*Chloridea obsoleta*), (4) the green stink bug (*Nezara viridula*), (5) the cotton stainer (*Dysdercus andreæ*), (6) the leaf blister mite (*Eriophyes gossypii*), (7) West Indian peach scale (*Aulacaspis pentagona*), (8) the hemispherical scale (*Saissetia hemisphærica*), and (9) black scale (*S. oleæ*).

The aphids attacking cotton are usually controlled by parasitic and predacious insects and by an entomogenous fungus (probably *Acrostalagmus albus*).

The cotton worm (*Alabama argillacea*) is one of the most serious pests of cotton. The larvæ cause considerable damage by rapidly defoliating the plants. The presence of the larvæ can usually be detected by the odor they produce when feeding. Cotton plants should be frequently examined for worms and when worms are found the plants should be immediately dusted with a mixture made up of 1 part Paris green and 8 parts air-slaked lime. The dusting can easily be done by placing the mixture in a coarse cotton sack and slightly shaking it over the plant. The cotton bollworm (*Chloridea obsoleta*), which often causes considerable damage to the bolls, may be controlled by this same method.

The green stink bug (*Nezara viridula*) does serious damage to young squares and bolls by puncturing them. This causes boll dropping and boll rot. The control method recommended is that of hand-picking or knocking the bugs into a bucket containing water and a film of kerosene.

The cotton stainer (*Dysdercus andreæ*) discolors a large amount of cotton lint. To control it, the station suggests that the stainers be hand-picked or brushed into a bucket containing some water and kerosene. The stainers may also be trapped by placing handfuls of cotton seed every 15 or 20 feet between the rows. Each day the stainers can be collected from the seed piles.

The blister mite (*Eriophyes gossypii*) does serious damage to the foilage of cotton plants. Blisters appear on the leaves which later shrivel and drop. The control method used for the blister mite is a closed season,[6] during which time no cotton can be planted or old plants allowed to remain.

The scale insects rarely become numerous enough on cotton to cause severe damage. In case of severe infestation they may be controlled by the use of 1 part kerosene emulsion and 10 parts water.

INSECTS OF CORN AND HOPI MAIZE.

Corn and Hopi maize suffered severely from insect pests during the year. Young corn plants were severely damaged by the corn leaf-hopper (*Dicranotropis maidis*), while very few were found on Hopi maize. The eggs of the corn leaf-hopper are laid on the funnel-shaped terminal leaves; and on hatching the young nymphs attack young leaves, sucking the juice from the plant, and often causing the plant to wither or die.

The contact insecticides used were carbolineum, tobacco wash, and whale-oil soap-tobacco wash, none of which gave satisfactory results.

The carbolineum insecticide was diluted 1 part to 100 parts water. This treatment was discontinued because very few leaf-hopper adults or nymphs were killed, and about 75 per cent of the corn plants were badly burned, while probably 25 per cent of the plants were killed.

The tobacco wash was used on a plat of 10 rows, the solution being diluted 1 to 50 parts water. One spraying showed that about 50 per cent of the adults and nymphs were killed, and also that at least 50 per cent of the corn plants were either badly burned or killed. Spraying with this solution was therefore discontinued.

The spray next tried for control was a homemade solution of whale-oil soap and tobacco water, 1 pound of whale-oil soap being completely dissolved in 6 gallons of water, and 1 pound of leaf tobacco or stems being steeped in 2 gallons of water. The whale-oil soap solution and tobacco were mixed and used without diluting. The results obtained, while not satisfactory, were an improvement over the two former solutions. About 25 per cent of the corn plants were severely burned, but at least 50 per cent of the nymphs and adults were destroyed. Further experiments with this solution should be made before it is discarded as useless.

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[6] The closed season is regulated by the Cotton Pest Commission, appointed by the Colonial Council to serve for 1 year.

Dicranotropis maidis is the most severe pest of corn in St. Croix, but there is no record of it damaging corn on the islands of St. John or St. Thomas.

The corn earworm (*Chloridea obsoleta*) was found damaging both young corn plants and ears. Hopi maize was more severely attacked than corn. The corn earworm can be satisfactorily controlled by hand-picking or dusting the plants with equal parts air-slaked lime and arsenate of lead, or with Paris green, 1 part to 8 parts air-slaked lime.

About the time the corn and Hopi maize are nearing maturity the stalks become severely infested with the stalk-borer (*Diatræa saccharalis*). The control method recommended for combating this pest is the destruction of all corn or Hopi maize stalks after harvesting the crop. Both corn and Hopi maize were infested with the larvæ of a syrphus fly (*Toxomerus politus*?). Larvæ were found in the axils of the leaves and in leaf sheaths of the ears. In Hopi maize large numbers of larvæ and pupæ were found in the pith of the cob.

The corn aphis (*Aphis maidis*) occasionally appeared on young corn, but since parasitic and predacious insects kept it in control no artificial control measures were required.

WEST INDIAN SWEET-POTATO WEEVIL (EUSCEPES BATATÆ).

The West Indian sweet-potato weevil (*Eucepes batatæ*) is the most serious pest of sweet potatoes in the Virgin Islands. The eggs are laid on the vines and tubers and within 5 or 6 days hatch into small white larvæ which are legless, have curved bodies, and a chitinous head. The larval stage is completed in about 15 days' time, and the white pupal stage lasts about 7 or 8 days.

The experiment station also carried on experiments to control the sweet-potato weevil. In June and July, 1919, all vines or drawn plants were dipped in kerosene-fusel oil emulsion,[7] 1 part being used to 10 parts water. This treatment reduced the injury to sweet potatoes about 75 per cent. Untreated vines used as checks showed about 90 per cent infestation. Late-planted draws (December) were treated in the same manner. The injury to late-planted vines was reduced about 60 or 65 per cent. Untreated vines used as check showed about 98 per cent infestation.

Since sound sweet potatoes are subjected to attack by weevils when stored with infested tubers, an experiment in fumigation was conducted to determine the effect on the weevils. The tubers were placed in a drum and fumigated with carbon bisulphid, 1 pound of the bisulphid being used to 350 cubic feet of space. The drum or compartment used for fumigating was kept tightly closed for 30 to 48 hours, and the weevils in the larval, pupal, and adult stages were killed.

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[7] Made from 4.5 pounds whale-oil soap dissolved in 1,000 cubic centimeters fusel oil to which 8,000 cubic centimeters of kerosene has been added, see p. 26.

It is recommended that clean, sound, fumigated tubers be used when producing home-grown draws.

WHITE FLIES.

Two species of white flies were noted (*Aleurodicus cocois* and *Aleurothrixus floccossus*). *A. cocois* was found attacking the leaves of almond (*Terminalia catappa*), banana (*Musa sapientum*), calabash (*Crescentia cujete*), coconut palm (*Cocos nucifera*), and other palms, and *Ficus elastica*. *A. floccossus* was found attacking guava (*Psidium guava*). In the larval stage the small coccinellid beetle (*Exoplectra* sp.) was found doing considerable damage to *A. cocois* on coconut palms. No natural enemies were found attacking *A. floccossus*. Unsuccessful attempts were made to introduce the red fungus of the white fly (*Aschersonia aleyrodes*) as a control measure for these flies.

INSECT NOTES.

During the fiscal year the cattle tick (*Margaropus annulatus australis*) was found every month on the cattle. The infestation in St. Croix seems to be at its worst in May, June, and July. On the islands of St. John and St. Thomas the cattle were infested with ticks during the early part of June.

In January, toads received from Barbados were found to be infested with a reptile tick (*Amblyomma dissimila*).

In St. Croix the fig-borer (*Batocera rubus*) was found doing severe damage to fig trees (*Ficus elastica* and *F. pedunculata*), and to the mango tree (*Mangifera indica*). In St. John the native fig (*F. pedunculata*) showed severe attacks, and in St. Thomas both the native fig and the papaya (*Carica papaya*) were attacked. Notes on the life history of the fig-borer show that the eggs are oviposited in May and hatch in from 48 to 72 hours. The larvæ tunnel under the bark and into the soft wood of the tree. In some cases it was found necessary to trace a distance of 10 feet in the tunnel before the larvæ were found. After about 7 or 8 months, the larvæ complete their development and pass into the pupal stage for 2 or 3 months. The adult beetles, both male and female, have been kept in captivity for periods of 2 and 3 months, and fed on the leaves and branches of *F. elastica*.

Collections of mosquitoes[8] from every section of the island of St. Croix showed only three species: *Ædes calopus*, *Anopheles albimanus*, and *Culex quinquefasciatus*. Such control measures as draining mudholes and standing water, spraying kerosene into septic tanks, mudholes, ditches, and barrels, and screening where needed, were used.

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[8] Specimens were obtained through the courtesy of Lieut. H. V. Hughens, chief sanitary officer for St. Croix.

In these islands wood ants often cause considerable damage to timber in houses. One species belonging to the genus Cryptotermes was found working in the sills of houses on the station farm. Sugar and white arsenic, 1 to 20 parts, respectively, may be used for control. The use of wood preservatives, such as creosote and tars, is also recommended.

Castor beans (*Ricinus communis*) were found infested with two insects, one (*Corythuca gossypii*) attacking the leaves, and the West Indian white peach scale (*Aulacaspis pentagona*) attacking the stems. These insects were also found on the islands of St. John and St. Thomas. Castor-bean insects may be readily controlled by contact insecticides.

Observations on a limited amount of truck crops have shown a variety of pests.

Slugs (*Veronicella occidentalis*) are reported doing severe damage to all vegetables in St. Thomas. The control measures recommended are (1) the dropping of fresh-cut vegetable leaves between the rows in the evening, and the next morning collecting the leaves and destroying the slugs that have crawled under them; (2) the sprinkling of a small amount of air-slaked lime around the plants to protect them from the slugs; and (3) hand-picking at night, aided by light from lanterns.

No specimens of slugs were obtained from St. Croix or St. John.

Beans were severely damaged by the green stink bug (*Nezara viridula*), in some cases 50 per cent of the green pods having been punctured and rendered unfit for use. The only practical means of control in truck crops is hand-picking.

The bean leaf-roller (*Eudamus proteus*) was found, but because of parasitic insects no serious damage resulted. One parasite (*Chalcis* sp.) is probably new.

Aphids and red spiders were noted on beans, but no severe damage to the plants resulted from their attacks.

Beet leaves were severely damaged by the southern beet webworm (*Pachyzancla bipunctalis*). The leaves were webbed together and then skeletonized. Paris green and air-slaked lime, 1 to 8 parts, respectively, or arsenate of lead and air-slaked lime in equal parts, are recommended for dusting as a control measure.

The most severe pest of cabbage and kohl-rabi was the diamond-back moth (*Plutella maculipennis*). The larvæ skeletonize the leaves and retard the growth of the plants. As a control measure, Paris green and air-slaked lime, in parts 1 to 8, were used. Marsh[9] recommends a spray for control made up of Paris green and soap, 2 to 6 pounds, respectively, and 100 gallons of water.

The southern cabbage butterfly (*Pontia monuste*) was also found feeding on the leaves of cabbage and kohl-rabi, but not in sufficient numbers to do severe damage.

The cabbage aphis (*Aphis brassicæ*) was likewise found, but, since it was controlled by parasitic and predacious insects, no control measures were undertaken.

Cucumbers, melons, and squashes were seriously injured by the melon worm (*Diaphania hyalinata*), the larvæ of which not only defoliate the plants, but bore into the vine and fruit. The melon worm may be controlled by dusting the plants with 1 part Paris green to 8 or 10 parts air-slaked lime, or arsenate of lead and air-slaked lime in equal parts.

Aphids (*Aphis gossypii*) were found attacking cucurbits, but natural enemies usually keep them in check.

Eggplants were attacked by aphids, mealy bugs (*Pseudococcus virgatus*), and scales (*Pulvinaria urbicola* and *Saissetia hemisphærica*). Sprayings with 1 part kerosene-fusel oil emulsion to 10 parts water were found a very effective means of control.

Okra plants were found infested with aphids, the West Indian peach scale (*Aulacaspis pentagona*), the hemispherical scale (*Saissetia hemisphærica*), the black scale (*S. oleæ*), mealy scale (*Pulvinaria urbicola*), and the mealy bug (*P. virgatus*). A few specimens of *Diaprepes abbreviatus* were found on okra pods, but no damage was noted. The scale insects of okra may be controlled by using kerosene-fusel oil emulsion, 1 part to 10 parts water.

The following insects were found attacking tomatoes: The tomato fruit worm (*Chloridea obsoleta*), and scale insects (*Aulacaspis pentagona, Pulvinaria urbicola*, and *Pseudococcus virgatus*), the green stink bug (*Nezara viridula*), the cotton stainer (*Dysdercus andræa*), and aphids.

The green stink bug (*N. viridula*) has caused the most damage to the fruit by puncturing the blossom ends. Hand-picking is recommended as a method of control.

Stored grain and grain products were often severely damaged by the grain weevils (*Calandra granaria* and *C. oryza*), the Indian meal moth (*Plodia interpunctella*), and the meal snout moth (*Pyralis farinalis*). The control measures employed against the insects in stored grain was fumigation with carbon bisulphid, 1 pound to 1,000 cubic feet of space.

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[9] U. S. Dept. Agr., Jour. Agr. Research, 10 (1917), No. 1, pp. 9.

IMPROVEMENTS AT THE ST. CROIX EXPERIMENT STATION.

The new implement shed in course of erection last year was completed, and the entomologist's house situated in the lower yard belonging to the station was thoroughly repaired and painted. The two houses and a part of the office building were screened in. An insectary is now in course of erection.

An electric-light plant was installed during the year and is working satisfactorily. A gas-making machine was introduced for use in the chemical laboratory. A cotton gin was received from the Porto Rico Agricultural Experiment Station, set up, and operated for ginning small samples. A small sugar evaporating pan and a centrifugal machine were received and installed.

A cattle dipping vat for the eradication of the cattle tick was erected. A small tractor and a motor cultivator were received and given trials.

RAINFALL AT THE EXPERIMENT STATION.

The rainfall for 1919 was exceptionally good, the amount and distribution being as follows:

	Inches.		Inches.
January	2.74	August	2.10
February	1.76	September	7.17
March	1.64	October	2.05
April	19.44	November	4.32
May	2.19	December	4.51
June	3.16		
July	8.82	Total	59.90

The rainfall for the first six months ending June 30, 1920, was much below normal, and the amount and distribution were as follows:

	Inches.		Inches.
January	2.73	May	0.41
February	3.21	June	1.13
March	1.86		
April	.05	Total	9.39

The scanty rainfall of October, 1919, and of the first six months of 1920 proved very detrimental to the experiment work. Over 100,000 cuttings of new and promising cane varieties were distributed to plantations in October, and planted in plats alongside the standard variety, Ribbon. Most of these experiments will give no definite results, because a large percentage of the cuttings failed to germinate. The experiments, furthermore, were spoiled by the severe drought of 1920.

The new cane seedlings raised from seed sown in November and December, 1919, were almost entirely destroyed by the dry weather.

The usual May planting of corn and legumes for experimental purposes could not be carried on, and the seed saved from last year is in danger of losing its germinating capacity before weather sufficiently favorable for planting sets in.